UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/534,826	01/09/2006	Minoru Akaishi	052514	8864

38834 7590 04/02/2009

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP
1250 CONNECTICUT AVENUE, NW
SUITE 700
WASHINGTON, DC 20036

EXAMINER	
STALDER, MELISSA A	

ART UNIT	PAPER NUMBER
1793	

MAIL DATE	DELIVERY MODE
04/02/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/534,826	AKAISHI ET AL.	
	Examiner	Art Unit	
	MELISSA STALDER	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 and 2 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for producing the sintered body having grain size of 100 nm or less from sintering powder consisting essentially of ultrafine-grain natural diamond powder, does not reasonably provide enablement for the sintered body consisting essentially of diamond powder having grain size of 100 nm or less. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

While the specification supports the freeze-dried powder consisting essentially of the diamond powder and the powder sintered to make a body having the claimed grain size, the specification is not enabling for the sintered body itself being comprised of powder and the powder itself having the claimed grain size.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention

was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiraki (US 6,337,060) in view of Sundback (US 5,047,182) in view of Slutz (EP 0 482 372) in view of Yazu (US 4,610,699). Hiraki teaches a method for producing diamond particles where the silicon is removed from the diamond powder. The diamond powder was made of 0-2 micron size grade diamonds (examples 2 and 3). Further, Hiraki teaches that the grain size of the diamond can be as small as 5 nm and under 200 nm (example 1 and example 2). Hiraki teaches a suspension or dispersion in a medium such as water and alcohol (aqueous) (abstract). Hiraki does not teach freeze-drying or sintering without a sintering aid. Sundback teaches freeze-forming a slurry made of inorganic sinterable particulates and then drying the piece so formed by a predominantly sublimative process followed by sintering (col. 1, lines 17-24). Slutz teaches sintering of a polycrystalline CNB/diamond in the absence of a sintering aid material (col. 1, lines 11-15). Yazu also teaches producing a hard diamond sintered body in a sintering process using diamond powders in a reaction vessel made of Ta and without a sintering aid such as carbonate. The product of Yazu has a Vickers hardness of 2000. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the diamond particles of Hiraki with the freeze-drying of Sundback and the process of sintering without a sintering aid of Slutz because Sundback teaches that freeze drying can be used with a variety of inorganic powders because freeze drying can overcome thermal drying stresses which would be destructive. Additionally, an ostensible "freeze-drying" process allows for capillary forces between the inorganic

particles, thereby pulling them together during drying to yield a denser, smoother surface (col. 3, lines 25-37; col. 3, lines 58-66). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Hiraki and Sundback with the process of Yazu because Yazu teaches a sintering process that is distinguishable from traditional sintering because the reaction vessel where the product is then more stable and is more heat resistant than diamonds produced in traditional sintering processes (col. 1, line 35-41; col. 2, lines 14-32; col. 4, lines 55-57). Further, Slutz teaches that sintering the polycrystalline CBN/diamond conjoint compacts make the masses fully dense and thermally-stable (col. 2, lines 16-22).

Regarding claim 2, Hiraki teaches that the method for producing hydrophilic diamond particles removes the impurities and contaminants from the diamond particles that cause the diamond powders to exhibit a light to dark grayish color (col. 1, lines 41-58). Because the impurities are removed, the diamond particles will no longer be dark but will be light transparent, which is what diamonds without impurities will appear. According to example 2 in Hiraki, Raman spectroscopy shows a clear record showing exclusively the spectrum for a diamond which will inherently be a light transparent crystal.

Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiraki (US 6,337,060) in view of Sundback (US 5,047,182) in view of Slutz (EP 0 482 372) as in claims 1 and 2, further in view of Yazu (US 4,610,699). Slutz teaches a high pressure/ high temperature apparatus which sinters at a pressure of 80 Kbars (8 GPa), which is essentially the same as the present claims. Further, Slutz teaches that the

temperature should be from about 1500 to 2300 (col. 4, lines 3-10). Hiraki, Sundback, and Slutz do not teach the use of a Ta or Mo capsule. Yazu teaches a reaction vessel (capsule) that is sealed containing the diamond powder for sintering. The vessel can be made of Ta or Mo (Example 1; claim 4). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the capsule of Yazu with the method of producing diamonds in Hiraki, Sundback and Slutz because Yazu teaches that a diamond sintered in this way has superior heat-resistance and abrasion-resistance (abstract).

Response to Arguments

Applicant's arguments filed February 4, 2009, have been fully considered but they are not persuasive.

Applicant argues that it would not have been obvious to combine the teachings of Slutz with Hiraki and Sundback. However, Slutz teaches a sintering process using diamond and a substance similar to diamond (polycrystalline CBN) in a process where the product is thermally stable and dense. Therefore, one of ordinary skill in the art at the time of the invention would combine these teachings. In addition, Yazu teaches a process using a reaction vessel (capsule) with diamond and no traditional sintering aid where the product is more heat resistant, a useful property if the diamond is to be used as an abrasive or will be exposed to high temperatures.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MELISSA STALDER whose telephone number is (571)270-5832. The examiner can normally be reached on Monday-Friday, 8:00-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Melvin Curtis Mayes can be reached on 571-272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MS
03-26-09

/Melvin Curtis Mayes/
Supervisory Patent Examiner, Art Unit 1793